Honors Biology Test
Chapter 13 and 14 - Evolution

1. In a population that is in Hardy-Weinberg equilibrium, the frequency of a recessive allele for a certain hereditary trait is 0.20. What percentage of the individuals in the next generation would expect to have the dominant trait?
   a. 8% b. 16% c. 32% d. 64% e. 96%

2. Which of the following is a correct statement about mutations?
   a. They are a source of variation for evolution.
   b. They drive evolution by creating mutation pressures.
   c. They are irreversible.
   d. They occur in germ cells but not in somatic cells.
   e. They are most often beneficial to the organisms in which they occur.

3. In a large, sexually reproducing population, the frequency of an allele changes from 60% to 20%. From this change, one can most logically assume
   a. that the allele is linked to a detrimental allele
   b. that the allele mutates readily
   c. that random processes have changed allelic frequencies
   d. that there is no sexual selection
   e. that the allele reduces fitness

4. Natural selection tends to reduce variation in gene pools. Which process serves to balance natural selection by creating new alleles?
   a. meiosis
   b. sex
   c. mutation
   d. migration
   e. reproduction

Questions 5 and 6. In a certain flock of sheep, 4 percent of the population has black wool and 96 percent has white wool. Assume that the population is in Hardy-Weinberg equilibrium.

5. If black wool is a recessive trait, what percentage of the population is heterozygous for this trait?
   a. 4% b. 20% c. 32% d. 64% e. 80%

6. What percentage of the population is homozygous for white wool?
   a. 20% b. 40% c. 64% d. 80% e. 96%

7. What is the measure of Darwinian fitness in a population?
   a. longevity in a species
   b. survival under adverse conditions
   c. the number of fertile offspring
   d. strength, in a predator
   e. fleetness, in a prey animal

8. Which term best describes a change in allelic frequencies due to an influx of new members into a population?
   a. gene flow
   b. genetic drift
   c. founder effect
   d. selection
   e. convergent evolution

Questions 9-11. In 2468, two male space colonists and three female space colonists settle on an uninhabited Earth-like planet in the Andromeda galaxy. The colonists and their offspring randomly mate for many generations. All five of the original colonists had free ear lobes, and two are heterozygous for that trait. The allele for free ear lobes is dominant to the allele for attached ear lobes.

9. If one assumes that the Hardy-Weinberg equilibrium applies to the population of colonists on this planet, about how many people will have attached ear lobes when the planet's population reaches 10,000?
   a. 0 b. 400 c. 800 d. 1000 e. 10,000

10. If two of the original colonists happened to die before they produced offspring, the ratios of genotype could be quite different in the subsequent generations. This is an example of
   a. Diploidy
   b. gene flow
   c. genetic drift
   d. diversifying selection
   e. stabilizing selection

11. After many generations, the population on this planet has an unusually high frequency for the incidence of color blindness. This is most likely due to
   a. the founder effect
   b. sexual selection
   c. coadapted genes
   d. mutations
   e. pleiotropy

12. About seventy-five percent of the people in the United States can roll their tongue. The allele for tongue rolling is dominant over the allele for inability to roll your tongue. What is the frequency of the dominant allele in the population?
   a. 0.50 b. 0.56 c. 0.25 d. 0.75 e. 0.87

13. All of the following influenced Darwin as he synthesized the concept of natural selection EXCEPT
   a. Mendel's laws of inheritance
   b. The animals of the Galapagos
   c. Lyell's *Principles of Geology*
   d. Malthus' *Essays of Populations*
   e. the results of artificial selection

14. Of 400 people who dwell on a Pacific island, 16 are homozygous recessive for a trait that is in Hardy –Weinberg equilibrium in the population. The number of heterozygous people is
   a. 256. b. 32. c. 64. d. 128.

15. New genes may be produced by
   a. immigration. b. mutation. c. crossing over. d. all of the above

16. What accounts for the fact that polydactylism is prevalent and Tay-Sachs disease virtually absent in one human population in the United States while Tay-Sachs disease is prevalent and polydactylism virtually absent in another?
a.Natural selection has promoted these differences since humans live in many different environments.
b.Mutation rates differ between different loci.
c.There is little gene flow between the two populations.
d.The populations are small, and therefore genetic drift is a major factor in the determination of allele frequencies.

17. Which is "more fit" in terms of natural selection?
a. a woman who live 105 years and has 2 children
b. a woman who lives 50 years and has 5 children
c. a woman who lives 70 years and has 5 children
d. a woman who lives 25 years and has 6 children

18. Some of Darwin's most important discoveries were based on studies of birds captured in
a. Tahiti in the Pacific Ocean
b. Ecuador
c. Madagascar off the coast of Africa
d. Galapagos Islands off the coast of Ecuador
e. Tahiti in the Carribean

19. A common and rapid means of speciation in plants (but not in animals) is
a. allopatric b. polyploidy c. temporal isolation d. mechanical isolation

20. Two different species of pine release their pollen at different times. This is an example of
a. geographic isolation
b. ecological isolation
c. temporal isolation
d. mechanical isolation

21. Which of the following is NOT a post zygotic isolation mechanism?
a. gametic incompatibility
b. hybrid infertility
c. hybrid inviability
d. all of these are postzygotic isolation mechanisms

22. Allopatric speciation requires
a. gradual evolutionary changes
b. geographic isolation
c. polyploidy
d. adaptive radiation

43. Compare artificial and natural selection, giving examples of each. 4 points

44. Describe and compare how Darwin and Lamarck would each explain the evolution of jumping ability in kangaroos. Be very clear. 4 points

45. A small population of a species of bear lives in an area on a mountainside. Almost all of the bears are a light- brown color except for about ten bears that have a dark-brown speckling. Describe an event that could cause genetic drift involving color in these bears. What would the effect be after 100 years? 3 points